Factors Related to Sense of Coherence (SOC) among Nurses in Japan

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Abstract— **The sense of coherence (SOC) concept, which represents the ability to overcome difficulties, influences factors predicting mental health and protection for effects of stress. This study aimed to identify factors related to SOC among nurses because it provides early indications of mental health disorders, preventing the onset of and promoting mental health. In June 2015, we conducted a self-administered questionnaire survey of 1895 nurses at four hospitals in the Kanto region, Japan. The questionnaire included a 13-item SOC scale, demographic, and environmental factor questions. With a multiple regression analysis, the variables with the highest standardized partial regression coefficients were used to divide respondents into two groups to compare specific features. We obtained 1114 (58.8%) valid responses. Factors related to the SOC score were feeling depressed, tendencies toward neurosis, overcoming past stressful events, self-esteem, someone outside the workplace who provide support, and a sense of fulfillment in the work performed. Some features of depression were 20s year group, eating alone, poor sleep, not having overcome past stressful events, and dissatisfaction with the assigned ward even when desiring to work in the present position. To prevent feelings of depression for nurses in the 20s year group, supervisors need to understand individual characteristics including sleeping conditions and daily life habits. Hospital administrators need to adjust conflicts between desired work assignments and satisfaction with the place of work. Knowing both the SOC level and the working environment may be used to prevent depressed feelings in nurses.**

Keywords-sense of coherence; salutogenesis; nurse

I. INTRODUCTION

Work stress is a matter of concern, and measures to improve mental health are a responsibility of the employing entities [1]. According to a survey of the conditions nurses work under [2], nurses suffer from worries about overwork and worries about poor health. Mental health disorders among employees in medical and welfare occupations is the highest at 76.6% among 18 industry areas [1].

Antonovsky [3] studied menopausal women who had lived through World War II, and even when forcibly housed and having experienced extreme stress when they were young, these women were able to maintain mental and physical health. Antonovsky was concerned with positive factors such as in people who are bright and positively alive, and focused on the salutogenesis of how health is recovered, maintained, and promoted. The sense of coherence (SOC) is a quality found among people who have survived harsh conditions and have overcome difficulties in life.

With SOC defined as a global orientation that expresses the extent to which one has a pervasive, enduring thought and dynamic feelings of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) that resources are available to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement. There are three subscales in SOC: comprehensibility, manageability, and meaningfulness. The SOC scale has recently attracted attention in the health maintenance field.

In Japan, SOC research is increasing and it is clear that considering SOC can play a role in alleviating the mental and physical effects of stressors. The SOC of nurses is associated with depression [4,5,6], coping characteristics [6], intention to remain in paid work [7], work control [8], burnout [9], and also stress responses [10]. These studies were reports with small sample sizes and limited targets. Basic research into the SOC level of nurses still requires more investigation. Workplace mental health measures focus on external factors of quantitative and qualitative load reductions, but it is also necessary to consider measures of internal factors, such as those evaluated by the SOC scale (level). The aim of this study is to identify factors relevant to SOC because these may be concerned with early stages of mental health disorders, and prevention of the onset of these, and would assist in promoting the mental health of nurses.

II. METHODS

A. Participants

The authors carried out a self-administered questionnaire survey of nurses in national (other than university hospitals) and public medical hospitals with more than 400 beds in south Kanto region of Japan. The directors of nursing service departments had agreed to cooperate with our research in the four hospitals. The subjects were 1895 nurses.

B. Measurements

1) Sense of coherence

The Japanese version of the SOC-13, which was described and verified for reliability and validity by Yamazaki [11] and is based on the original scale of Antonovsky [3], was used. It comprises the following subscales: comprehensibility, manageability, and meaningfulness. The Cronbach's alpha coefficients in this study ranged up to 0.79. The SOC (Sense of Coherence) scale was rated on a 7-point scale. The sum of the scores (SOC scale score) ranges from 13 to 91, with higher scores indicating a stronger SOC. Permissions to use the SOC questionnaire were obtained from Yamazaki (developer of the Japanese version of the SOC) in September 2014 and Eriksson (for the original version of the SOC) in August 2016.

2) Demographic attributes

Information was collected on gender, age, marital status, parental status, education, experience as a nurse, position, qualification, depressed feelings, quality of sleep, healthy practices (food, diet, exercise, and rest) [12], something or someone else to rely on, someone outside the workplace who will provide support in cases of trouble, community activities, and chronic diseases, The Two-Item Self-Esteem scale (TISE) developed by Minoura et al. [13], which has been shown to have reliability and validity, consists of two aspects of the self-esteem concept: one is a self-evaluation, and the other is a self-acceptance. Responses were scored using a 5-point scale. The higher the total score, the higher the self-esteem. Permission to use the TISE questionnaire was obtained from Minoura in November 2014.

3) Environmental Factors

Information was collected on the participant specialization, working schedule, working field, the ward assignment preference, and sense of work fulfillment. Job stressors were assessed using a part of the Job Content Questionnaire (JCQ) [14]: decision latitude, job demand, supervisor support and coworker support. Permission to use the JCQ questionnaire (the Japanese version of the JCQ) was obtained from Kawakami in March 2015.

4) Past experience

With regard to past experience, subjects were asked to report the number of years of doing sport up to 18 years of age and whether they had overcome the most serious stressful events experienced.

5) The Brief Scales for Coping Profile

The coping strategy was assessed using the Brief Scales for Coping Profile (BSCP) developed by Kageyama et al. [15] that has demonstrated reliability and validity. The BSCP consists of 18 items rated on a 4-point scale. It assesses worker tendency to choose a coping profile using six subscales, "Actively solving problems", "Avoidance and suppression", "Changing moods", "Changing point of view", "Seeking help for solutions", and "Emotional expressions involving others" in stressful daily situations. For each item the higher subscale score was considered the coping profile for this nurse. Permission to use the BSCP questionnaire was obtained from Kageyama in September 2014.

6) The Ten Item Personality Inventory

The personality was assessed using the Japanese version of the Ten Item Personality Inventory (TIPI-J) developed by Oshio et al. [16], which has shown reliability and validity. The TIPI-J measures 5 personality trends: extroversion, cooperativeness, diligence, tendency towards neurosis, and openness. The higher of the determined scores was considered the personality trend of this person. Permission to use the TIPI-J questionnaire was obtained from Oshio in September 2014.

C. Procedures

In June 2015, self-administered questionnaires were mailed to the hospitals. The directors of the nursing service departments were asked to distribute these to the participants and to provide collection bags for the completed questionnaires. The questionnaires were left at the hospitals for 3 weeks and those collected were returned to the author by the directors.

D. Statistical analysis

First, for the participant demographic characteristics, the frequency, mean total SOC scores, and standard deviation of each variable were calculated. The relationships between the mean total SOC scores and various factors were determined. The tests of significance carried out were the t-test and one-way ANOVA. For the variables with interval scales, the correlation coefficients with the mean total SOC scores were calculated. Second, to clarify the relevant factors of the SOC, a stepwise multiple regression analysis for SOC scale scores was conducted, using independent variables where the statistical significance was at $P < 0.2$. For questions with more than three choices: sleep quality, depressed feelings, the ward assignment preference, and having overcome the most serious stressful events were converted into dummy variables. The other responses were transformed into dichotomous ratings in the multivariate analysis. Finally, the variable with the highest explanatory rate of the depressed feelings was divided into two groups. To establish the difference between the group with depressed feelings and that without depressed feelings, the χ^2-test for each explanatory variable was carried out. The continuous variables were compared by the t - test. Further, a residual analysis was conducted to examine which cell contributed to this significance. For the statistical analyses, IBM SPSS Statistics (v. 23.0; IBM Corporation, Armonk, NY, USA) was used.

E. Ethical considerations

The cooperation of the directors of the nursing service department at each hospital was obtained by explaining the purpose of this study in writing. The study objectives and methods were explained to the participating nurse supervisors in writing; everybody involved was informed that their anonymity would be protected, that their participation or withdrawal was as determined by their own free will, and that refusal to participate or withdrawal of consent would not result in any negative consequences. The protocol for this study was approved by the Ethics Review Committee of the International University Health and Welfare (No.14-Ig-110, January 2015).

III. RESULTS

A. Response rate and the mean total SOC score

The authors distributed questionnaires to 1895 nurses, and collected from 1241 (65.5%). Of these, responses from 1114 nurses were determined as valid responses. For the 1002 female nurses (90.1%) and 111 male nurses (9.9%), the respective SOC scores were 52.27 and 51.59, with the difference not statistically significant (Table 1).

B. Participant demographic data

The participant demographic data and the mean total SOC scores are shown in Table1. The mean age was 33.9 ± 9.0 years. The mean total SOC scores increased with age. The most common position was employment as staff nurses (85.7%) and the number of years of experience as a nurse was ≤ 3 years

(20.7%), 4-15 years (53.3%), and ≥ 16 years (25.5%). The mean total SOC scores of the nurses who graduate schools or who held university degrees other than in nursing was higher than that of the nurses with other final educational backgrounds.

C. Demographic (Personal) factors and the total SOC score

The statistically significant variables were: age, having a spouse and children, education, experience as a nurse, position, quality of sleep, depressed feelings, something or someone to rely on, someone outside the workplace who will provide support in case of troubles, healthy eating practices, diet, exercise and rest, community activities for PTA or child relationship, and self-esteem (all, $P < 0.01$). In addition, the variables that reached statistical significant values were qualifications ($0.01 < P < 0.05$), community activities for volunteering or sport, and chronic diseases (all, $0.05 < P < 0.2$) (Table 1).

Table 1. Demographic factors and total SOC scores   N = 1114

Demographic factors		Participants		Total SOC score		
		n	(%)	Mean	SD	
Gender	Male	111	9.9	51.59	9.57	
	Female	1002	90.1	52.27	10.06	
	No answer	1	0.1	-	-	
Age	≤ 29 years	418	37.5	51.28	9.37	**
	30 - 39 years	408	36.6	52.62	10.24	
	40 - 49 years	221	19.8	52.27	10.28	
	50 - 59 years	60	5.4	54.37	11.08	
	≥ 60 years	7	0.6	62.57	5.16	
Spouse	Yes	435	39.0	53.87	9.98	**
	No	679	61.0	51.13	9.88	
Child	Yes	334	30.0	54.38	10.02	**
	No	779	69.9	51.27	9.86	
	No answer	1	0.1	-	-	
Education	Vocational school of nursing	664	59.6	51.90	10.22	**
	Nursing junior college	88	7.9	52.58	8.94	
	University of nursing	285	25.6	51.62	9.26	
	Graduate school of nursing	18	1.6	59.61	11.62	
	Graduate school or university with degree other than nursing	50	4.5	56.16	11.44	
	No answer	9	0.8	-	-	
Experience as a nurse	≤ 3years	231	20.7	50.55	9.19	**
	4 - 15 years	594	53.3	52.28	9.97	
	≥ 16 years	284	25.5	53.42	10.50	
	No answer	5	0.4	-	-	
Position	Staff	955	85.7	51.83	9.81	**
	Sub-head nurse	86	7.7	54.91	11.31	
	Head nurse	50	4.5	54.72	10.87	
	No answer	23	2.1	-	-	
Qualification	None	1038	93.2	52.11	9.95	*
	Certified nurse supervisor	9	0.8	61.00	11.31	
	Certified nurse specialist	5	0.4	49.20	11.48	
	Certified nurse	35	3.1	54.57	9.38	
	No answer	27	2.4	-	-	
Quality of sleep	Very bad	74	6.6	45.55	9.58	**
	Somewhat bad	507	45.5	50.86	9.91	
	Somewhat good	471	42.3	53.77	9.22	
	Very good	56	5.0	60.36	9.55	
	No answer	6	0.5	-	-	

Table 1 continued

			N	%	Mean	SD	
Depressed feelings		Not at all	63	5.7	61.33	10.02	**
		Hardly ever	348	31.2	57.21	8.39	
		Quite a lot	584	52.4	50.58	8.33	
		Very much	117	10.5	40.38	8.49	
		No answer	2	0.2	-	-	
Healthy practices Food	Eating vegetables	I do not care	91	8.2	50.07	11.03	**
		Not much	545	48.9	50.75	9.87	
		Yes	478	42.9	54.26	9.59	
	Balance various foods	I do not care	115	10.3	49.47	10.58	**
		Not much	708	63.6	51.57	9.67	
		Yes	290	26.0	54.82	10.08	
		Unknown	1	0.1	-	-	
Healthy practices Diet	Eating with someone	I do not care	425	38.2	49.96	10.23	**
		Not often	261	23.4	51.69	9.77	
		Yes	428	38.4	54.73	9.34	
	Restricted eating of snacks	I do not care	247	22.2	51.02	10.62	**
		No	583	52.3	52.10	9.60	
		Yes	283	25.4	53.40	10.19	
		Unknown	1	0.1	-	-	
Healthy practices Exercise	Regularly exercise on my own	I do not care	407	36.5	50.76	10.62	**
		Not much	523	46.9	52.94	9.44	
		Yes	184	16.5	53.29	9.84	
	Going out without reluctance if there is an opportunity	I do not care	202	36.5	48.77	10.51	**
		Not much	399	46.9	51.23	9.16	
		Yes	512	16.5	54.33	9.96	
		Unknown	1	0.1	-	-	
Healthy practices Rest	Taking a rest if you feel tired	I do not care	80	7.2	50.68	10.60	**
		Not often	481	43.2	51.08	10.03	
		Yes	553	49.6	53.39	9.77	
	Do not mind it when I do not well	I do not care	170	15.3	48.69	9.66	**
		Not	673	60.4	51.05	9.60	
		Yes	271	24.3	57.26	9.37	
Something or someone that I can rely on		Yes	818	73.4	52.80	9.74	**
		No	295	26.5	50.55	10.55	
		No answer	1	0.1	-	-	
Someone outside the workplace who will provide support in case of troubles		Never	39	3.5	43.03	11.65	**
		1～2 persons	432	38.8	50.31	9.44	
		3～4 people	387	34.7	52.74	9.38	
		≥ 5 people	255	22.9	56.01	9.95	
		No answer	1	0.1	-	-	
Community activity	Volunteer	Yes	21	1.9	56.38	10.86	†
		No	1079	96.9	52.17	9.98	
		No answer	14	1.3	-	-	
	Sports	Yes	110	9.9	53.94	11.31	†
		No	990	88.9	52.06	9.84	
		No answer	14	1.3	-	-	
	PTA / Child relationship	Yes	119	10.7	55.45	9.66	**
		No	981	88.1	51.86	9.99	
		No answer	14	1.3	-	-	
Self-esteem		≤ 4	225	20.2	45.44	9.07	**
		5 - 7	577	51.8	52.17	8.98	
		> 8	312	28.0	57.13	9.60	
Chronic disease		Yes	173	82.6	51.21	11.00	†
		No	920	15.5	52.42	9.82	
		No answer	21	1.9	-	-	

†$0.05 < P < 0.2$, * $0.01 < P < 0.05$, ** $P < 0.01$, according to the *t* - test and one - way ANOVA. SD, standard deviation.

D. Environmental factors and the total SOC score

The statistically significant variables were: night shifts per month, ward assignment preference, sense of work fulfillment, job stressors in decision latitude, job demands, supervisor support, and coworker support (all, *P* < 0.01). In addition, the variables that reached statistical significant values were the shift type (0.05 < *P* < 0.01), and the work section (0.05 < *P* < 0.2) (Table 2).

E. The past experience and the total SOC score

The statistically significant variables were whether the respondent had The statistically significant variables were whether the respondent had overcome the most serious stressful life events (*P* < 0.01), and the number of years of sport experience (Table 3).

F. Correlation between the continuous variables and the total SOC score

The correlation coefficient for self-esteem showed a positive intermediate correlation with the total SOC score (r = 0.433, *P* < 0.01), for personality, a tendency towards neurosis showed a negative intermediate correlation (r = -0.455, *P* < 0.01), while extroversion (r = 0.276, P < 0.01), cooperativeness (r = 0.309, *P* < 0.01), and diligence (r = 0.250, *P* < 0.01), all had weak positive correlations; for the coping profiles, actively solving problems (r = 0.280, *P* < 0.01), seeking help for solutions (r = 0.242, *P* < 0.01), and changing points of view (r = 0.336, *P* < 0.01) had positive weak correlations; emotional expressions involving others (r = -0.231, *P* < 0.01) and avoidance and suppression (r = -0.265, *P* < 0.01) had negative weak correlations (Table 4).

Table 2. Environmental factors and the total SOC score   N = 1114

Environmental factors			Participants n	(%)	Total SOC score Mean	SD	
Shift type	Three shifts		250	22.4	50.9	10.49	*
	Other than three shifts		862	77.4	52.6	9.84	
	No answer		2	0.2	−	−	
Night shifts per month	≤ 4 times		565	50.7	53.02	10.3	**
	≥ 5 times		535	48.0	51.41	9.63	
	Unknown		14	1.3	−	−	
Work section	Outpatient		118	10.6	53.47	9.52	†
	Mixed ward		615	55.2	51.65	10.04	
	Psychiatry		129	11.6	53.63	10.32	
	Operating theater		63	5.7	51.57	9.38	
	Emergency section		52	4.7	50.85	9.53	
	Critical care		95	8.5	52.80	10.70	
	Administrative department		22	2.0	54.55	10.72	
	No answer		20	1.8	−	−	
Ward assignment preference	Dissatisfied (the ward not as desired)		94	8.4	49.35	9.90	**
	Dissatisfied (the ward as desired)		147	13.2	46.25	10.00	
	Satisfied (the ward not as desired)		340	30.5	53.81	9.89	
	Satisfied (the ward as desired)		518	46.5	53.42	9.51	
	No answer		15	1.3	−	−	
Sense of work fulfillment	Strongly disagree		37	3.3	42.16	9.77	**
	Disagree		259	23.2	47.59	9.79	
	Agree		645	57.9	53.43	9.28	
	Strongly agree		169	15.2	56.96	8.94	
	No answer		4	0.4	−	−	
Decision latitude	My job allows me to make many decisions on my own	Strongly disagree	49	4.4	46.47	11.65	**
		Disagree	306	27.5	49.89	9.14	
		Agree	639	57.4	53.14	9.72	
		Strongly agree	118	10.6	55.53	10.92	
		No answer	2	0.2	−	−	
Job demands	I have enough time to get the job done	Strongly disagree	154	13.8	48.61	11.67	**
		Disagree	483	43.4	51.87	9.35	
		Agree	368	33.0	53.83	9.30	
		Strongly agree	105	9.4	53.31	11.34	
		No answer	4	0.4	−	−	

Table 2 continued

			n	%	Mean	SD	
Supervisor support	My supervisor is concerned about the welfare of subordinates	Strongly disagree	77	6.9	45.81	11.85	**
		Disagree	217	19.5	50.47	9.83	
		Agree	592	53.1	53.04	9.26	
		Strongly agree	225	20.2	53.91	10.38	
		No answer	3	0.3	−	−	
	My supervisor is helpful in getting the job done	Strongly disagree	70	6.3	46.10	11.86	**
		Disagree	211	18.9	50.45	9.75	
		Agree	586	52.6	52.90	9.40	
		Strongly agree	239	21.5	53.71	10.27	
		No answer	8	0.7	−	−	
Coworker support	People I work with are friendly	Strongly disagree	18	1.6	42.67	12.33	**
		Disagree	131	11.8	46.82	10.72	
		Agree	650	58.3	52.08	9.18	
		Strongly agree	313	28.1	55.20	9.93	
		No answer	2	0.2	−	−	
	People I work with are helpful in getting the job done	Strongly disagree	17	1.5	42.59	12.61	**
		Disagree	115	10.3	47.47	9.92	
		Agree	662	59.4	51.89	9.50	
		Strongly agree	317	28.5	55.01	9.89	
		No answer	3	0.3	−	−	

†$0.05 < P < 0.2$, * $0.01 < P < 0.05$, ** $P < 0.01$, according to the t - test and one - way ANOVA. SD, standard deviation.

Table 3. Past experience and total SOC score　　　　　　　　　　　　　　N = 1114

Past experience		Participants		Total SOC score		
		n	(%)	Mean	SD	
The number of years of doing sport up to 18 years of age	≤ 3 years (including none)	517	46.4	51.78	10.10	†
	≥ 4 years	597	53.6	52.56	9.92	
Whether or not overcome the most serious stressful events, in the past	Not yet overcome	155	13.9	45.85	11.07	**
	Somewhat overcome	562	50.4	50.81	8.52	
	Overcome	343	30.8	56.86	9.48	
	No such events	50	4.5	55.42	10.59	
	No answer	4	0.4	-	-	

†$0.05 < P < 0.2$, ** $P < 0.01$, according to the t - test and one - way ANOVA. SD, standard deviation.

G. Factors related to SOC determined with the stepwise multiple regression

The degree of freedom adjusted coefficient of determination was 52%. The multiple regression analysis identified factors that were related to SOC as depressed feelings ($\beta = -0.33$), tendencies toward neurosis ($\beta = -0.20$), past stressful events not overcome ($\beta = -0.16$), self-esteem ($\beta = 0.12$), someone outside the workplace to rely on for support in case of troubles ($\beta = 0.10$), sense of work fulfillment ($\beta = 0.10$). In the work environment, the ward assignment preference ($\beta = -0.07$) was factors related to SOC. In the coping profiles, emotional expressions involving others ($\beta = -0.08$), actively solving problems ($\beta = 0.05$), and seeking help for solutions ($\beta = 0.05$) were significant, but the standard partial regression coefficient was low (Table 5).

H. The characteristics of nurses with depressed feelings

Nurses with depressed feelings were significantly more common (showed a higher proportion) in the 20s age group (21-29 years of age), the quality of sleep poor, the most serious stressful events in the past not yet overcome or only somewhat overcome, fewer than two persons outside the workplace to rely on for support, and dissatisfaction with ward assignment as a different ward is preferred or the ward assignment preference is as desired but still unsatisfactory (all, $P < 0.01$). There were significantly more staff nurses in the group with depressed feelings than that without depressed feelings ($P < 0.01$). Nurses without depressed feelings were significantly more common among those in the 50s age group (50-59 years of age), where there is a spouse or child, when the most serious stressful events in the past had been overcome or where there was no such events, when graduate school or with a university degree other than nursing, although a different ward is preferred, eating with others, regularly doing their own exercise, having the opportunity to go out without being troubled, having a sense of work fulfillment, respondents making many

Table 4. Correlation between the continuous variables and the total SOC score — N = 1114

		Participants n	Mean	SD	Minimum	Maximum	Correlation coefficient	
Self - esteem		1114	6.20	1.75	2	10	0.433	**
The Brief Scale of Coping Profile	Actively solving problems	1112	9.63	1.68	3	12	0.280	**
	Seeking help for solutions	1105	9.04	2.15	3	12	0.242	**
	Changing moods	1111	8.49	2.25	3	12	0.055	
	Changing point of view	1113	8.47	2.18	3	12	0.336	**
	Emotional expressions involving others	1111	4.88	1.79	3	12	-0.231	**
	Avoidance and suppression	1106	6.49	2.05	3	12	-0.265	**
Ten Item Personality Inventory	Extroversion	1113	8.64	2.79	2	14	0.276	**
	Cooperativeness	1114	9.91	2.04	2	14	0.309	**
	Diligence	1114	7.25	2.41	2	14	0.250	**
	Tendency toward neurosis	1112	8.33	2.42	2	14	-0.455	**
	Openness	1114	7.55	2.36	2	14	0.145	**

** $P < 0.01$. SD, standard deviation.

Table 5. Factors related to SOC from the stepwise multiple regression analysis

Criterion variable	Explanatory variables	Adjusted R2 - value	β	P - value
SOC Total score		.522		
	Depressed feelings (very much) †		-0.333	0.000
	Depressed feelings (quite a lot) ‡		-0.285	0.000
	Depressed feelings (a little) §		-0.124	0.017
	TIPI-J ¶: neurosis tendencies		-0.200	0.000
	cooperativeness,		0.085	0.001
	diligence		0.083	0.001
	Self - esteem ¶		0.123	0.000
	Overcome past stressful events (not yet overcome) ††		-0.159	0.000
	Overcome past stressful events (somewhat overcome) ‡‡		-0.131	0.000
	Someone to support me outside the workplace when I have troubles ¶		0.102	0.000
	BSCP ¶: Emotional expressions involving others		-0.077	0.002
	Actively solving to problems		0.053	0.045
	Seeking help for solutions		0.054	0.038
	Sense of work fulfillment §§		0.103	0.000
	Dissatisfaction with the assigned ward even when desiring to work in the present ward †††		-0.070	0.004

† Do you feel down badly? "not at all" = 0, (hardly ever" = 0, "quite a lot" = 0, "very much" = 1); ‡ ("hardly ever" = 0, "quite a lot" = 1, "very much" = 0); § ("hardly ever" = 1, "quite a lot" = 0, "very much" = 0); ¶ Continuous variable; †† Whether or not overcome the most serious stressful events, in the past? "overcome = 0", ("not yet overcome = 1," "somewhat overcome = 0," "no such events = 0"); ‡‡ ("not yet overcome = 0," "somewhat overcome = 1," "no such events = 0"); §§ Do you feel motivated by your current job? ("strongly disagree / disagree = 0, agree / strong agree = 1"); ††† About desired department? (("dissatisfied (the ward not as desired) = 0, dissatisfied (the ward as desired) = 1," "satisfied (the ward not as desired) = 0," "satisfied (the ward as desired) = 0"))

decisions on their own, having enough time to get the work done, and having supervisor or coworker support (all, $P < 0.01$) (Table 6).

Table 7 showed that nurses with depressed feelings had significantly lower total SOC, comprehensibility, manageability, meaningfulness, and self-esteem (all, $P < 0.01$). For personality factors, the depressed feeling group had significantly lower scores in extroversion, cooperativeness, diligence and openness, and higher scores in neurotic tendencies (all, $P < 0.01$). For the coping profiles, nurses with depressed feelings had significantly lower scores when reporting actively solving problems or changing points of view, further, emotional expressions involving others or avoidance and suppression scores were significantly higher than for nurses without depressed feelings (all, $P < 0.01$) (Table 7).

Table 6. Differences in nurse characteristics for groups with and without depressed feelings

Depressed feelings			Yes n = 701 (%)	No n = 411 (%)	Total n = 1112 (%)	χ^2	
Gender	Male		59 (8.4)	52 (12.7)	111 (10.0)	5.14	*
	Female		641 (91.6)	359 (87.3)	1000 (90.0)		
Age	≤ 29 years		292 (41.7)	126 (30.7)	418 (37.7)	19.82	**
	50 - 59 years		28 (4.0)	32 (7.8)	60 (5.4)		
Spouse	Yes		242 (34.5)	191 (46.5)	433 (38.9)	15.56	**
	No		459 (65.5)	220 (53.5)	679 (61.1)		
Child	Yes		178 (25.4)	155 (37.7)	333 (30.0)	18.62	**
	No		522 (74.6)	256 (62.3)	778 (70.0)		
Health practices	Eating with someone	Done	406 (57.9)	281 (68.4)	687 (61.8)	12	**
		Not much or do not care	295 (42.1)	130 (31.6)	425 (38.2)		
	Regular exercise	Yes	424 (60.5)	281 (68.4)	705 (63.4)	6.94	**
		Not much or do not care	277 (39.5)	130 (31.6)	407 (36.6)		
	Going out without reluctance if there is an opportunity	Yes	558 (79.7)	351 (85.4)	909 (81.8)	5.63	*
		Not much or do not care	142 (20.3)	60 (14.6)	202 (18.2)		
	Do not mind when I do not feel well	Yes	581 (61.7)	361 (87.8)	942 (84.7)	4.91	*
		Not much or do not care	120 (17.1)	50 (12.2)	170 (15.3)		
Quality of sleep	Good		277 (39.9)	250 (60.8)	527 (47.6)	45.34	**
	Poor		418 (60.1)	161 (39.2)	579 (52.4)		
Overcame the most serious stressful events in the past experience	Not yet		125 (18.0)	29 (7.1)	154 (13.9)	47.46	**
	Somewhat overcome		372 (53.2)	189 (46.2)	561 (50.6)		
	Overcame it		178 (25.5)	165 (40.3)	343 (31.0)		
	No such events		24 (3.4)	26 (6.4)	50 (4.5)		
Someone outside the workplace who will provide support in case of troubles	> 3 people		373 (53.3)	268 (65.2)	641 (57.7)	15.08	**
	≤ 2 people		327 (46.7)	143 (34.8)	470 (42.3)		

Table 6 continued

Something or someone that I can rely on	Yes		499 (71.3)	317 (77.1)	816 (73.4)	4.53	**
	No		201 (28.7)	94 (22.9)	295 (26.6)		
Education	Graduate school or university with degree other than nursing		21 (3.0)	29 (7.1)	50 (4.5)	11.5	**
Position	Staff		614 (90.0)	340 (83.3)	954 (87.5)	10.61	**
	Sub-head nurse		44 (6.5)	42 (10.3)	86 (7.9)		
	Head nurse		24 (3.5)	26 (6.4)	50 (4.6)		
Clinical experience yeas	≤ 3years		159 (22.8)	72 (17.6)	231 (20.9)	9.7	**
	≥ 16 years		75 (6.8)	67 (6.1)	142 (12.8)		
Working section	Outpatient department		64 (9.3)	54 (13.3)	118 (10.8)	4.28	**
	Ward		623 (90.7)	351 (86.7)	974 (89.2)		
Ward assignment preference	Dissatisfied (the ward not as desired)		68 (9.9)	26 (6.4)	94 (8.6)	40.32	**
	Dissatisfied (the ward as desired)		123 (17.8)	24 (5.9)	147 (13.4)		
	Satisfied (the ward not as desired)		189 (27.4)	151 (37.1)	340 (31.0)		
Sense of work fulfillment	Yes		479 (68.6)	334 (81.5)	813 (73.4)	21.79	**
	No		219 (31.4)	76 (18.5)	295 (26.6)		
Decision latitude	My job allows me to make many decisions on my own	Agree	451(64.4)	304 (74.1)	755 (68.0)	11.22	**
		Disagree	249 (35.6)	106 (25.9)	355 (32.0)		
Job demands	I have enough time to get the job done	Agree	275(39.3)	197 (48.2)	472 (42.6)	8.21	**
		Disagree	424 (60.7)	212 (51.8)	636 (57.4)		
Supervisor support	My supervisor is helpful in getting the job done	Agree	486 (69.6)	330 (80.3)	816 (73.6)	15.13	**
		Disagree	212 (30.4)	81 (19.7)	293 (26.4)		
Coworker support	People I work with are helpful in getting the job done	Agree	495 (71.0)	328 (80.6)	823 (74.5)	12.4	**
		Disagree	202 (29.0)	79 (19.4)	281 (25.5)		

* $0.01 < P < 0.05$, ** $P < 0.01$, and according to the χ^2

Table 7. Differences in SOC, Self - esteem, and BSCP scores between groups with/without depressed feelings

Depressed feeling	Yes Mean ± SD	No Mean ± SD	Total Mean ± SD	
SOC Total score	48.88 ± 9.17	57.84 ± 8.77	52.19 ± 10.00	**
Comprehensibility	18.56 ± 4.29	21.93 ± 4.20	19.81 ± 4.56	**
Manageability	14.28 ± 3.48	16.94 ± 3.34	15.26 ± 3.66	**
Meaningfulness	16.03 ± 3.88	18.97 ± 3.56	17.11 ± 4.02	**
Self - esteem	5.89 ± 1.74	6.74 ± 1.63	6.20 ± 1.75	**
TIPI-J				
Extroversion	8.34 ± 2.77	9.17 ± 2.77	8.644 ± 2.80	**
Cooperativeness	9.68 ± 2.08	10.30 ± 1.91	9.91 ± 2.04	**
Diligence	7.06 ± 2.42	7.56 ± 2.36	7.24 ± 2.4	**
Neurosis tendencies	8.89 ± 2.33	7.38 ± 2.29	8.33 ± 2.42	**
Openness	7.40 ± 2.33	7.80 ± 2.40	7.55 ± 2.36	*
BSCP				
Actively solving problems	9.46 ± 1.68	9.91 ± 1.64	9.63 ± 1.68	**
Seeking help for solutions	8.90 ± 2.17	9.28 ± 2.08	9.05 ± 2.15	*
Changing moods	8.51 ± 2.23	8.47 ± 2.28	8.50 ± 2.25	
Changing point of view	8.12 ± 2.21	9.06 ± 2.10	8.47 ± 2.19	**
Emotional expressions involving others	5.03 ± 1.84	4.60 ± 1.68	4.88 ± 1.79	**
Avoidance and suppression	6.68 ± 2.03	6.15 ± 2.05	6.46 ± 2.05	**

$* \ 0.01 < P < 0.05$, $** \ P < 0.01$, and according to the t - test. SD, standard deviation.

IV. DISCUSSION

A. Institutions and participants

The participants in the study were nurses working in four national hospitals (other than university hospitals) and public hospitals with more than 400 beds in the south Kanto region of Japan. The means of the SOC total score of the hospitals were statistically significantly different ($P < 0.05$). We compared the results of the analysis of the 4 hospitals among the targeted hospitals and 933 participants, excluding hospitals with low mean SOC total scores. The included participants, however, showed results with very similar multiple regression analysis results.

The characteristic of all participants was nurses in the 20s and 30s age groups, each accounting for over 30%, and 90% of the total were female nurses. The age distribution of nurses who worked in hospitals in 2012 [17] is reported as 20% in the 20s and 30% in the 30s age groups, and the ratio of males to females is 1: 13. Although the participants in this study were slightly younger, the characteristics are very similar to nurses working in hospitals in general.

The adjusted R^2-coefficient for these related factors in the present study was 0.52. Murase, *et al.* [18] suggested that an adjusted R^2-coefficient of > 0.20 is sufficient in some instances, as social survey data contain much noise. This allows concluding that the present study provides meaningful results with high predictive accuracy.

There were no gender differences of the SOC scores of the participants here, but the meaning and import of differences between women and men in SOC levels are not fully agreed on at present. Yoshida, *et al.* [10] reported that nurses working at university hospitals do not show gender differences in SOC scores, and the present results would allow the conclusion that there are no gender differences in nurse SOC levels in the general nurse population. The participant mean age is 33.9 years, the mean of the SOC total score is 52.2 points, and the mean SOC total score increases with the age of the nurses. In a previous study, the mean age of university hospital nurses [19] was 32.3 years, the mean SOC total score was 51.9 points, and

for mother/wife nurses in a metropolitan hospital [8] it was 36.2 years, with a mean SOC total score of 56.7 points; with medical long-term care sanatorium nurses [7] the age was 46.0 years and the mean SOC total score 55.9 points. The age and SOC scores of nurses in the present study cannot be said to fully compare with previous studies, however, overall it may be presumed that the SOC score generally rises with age. Antonovsky [3] explains that "The SOC has stabilized by about 30 years of age, after which it will be difficult for large changes to occur". However, Yamazaki *et al.* [20] suggests the possibility that increases in the SOC scores can be expected by repeated important quality of life experiences even after stable adulthood. The results of these studies would allow the suggestion that experiences in the working environment of hospitals could lead to higher SOC scores.

B.   Factors related to the SOC of nurses

In this study, the factors related to the SOC score of nurses are shown to be the following six: feeling depressed, tendency towards neurosis, self-esteem, past experiences, someone outside the workplace who will provide support in cases of trouble, and a sense of work fulfillment; the former four are among the basic factors.

Nurses without depressed feelings had a higher SOC score. Some previous studies of: novice nurses [6], female nurses in general hospitals [4] and nurses with mother/wife roles [5] also reported that suffering from feelings of being depressed correlated with low SOC scores. From this, it may be surmised that nurses in the general population who feel no depression have a higher SOC score, and that raising the SOC score is important to include as a goal of mental health programs.

For personality, nurses with neurotic tendencies were more closely related to SOC than nurses without this personality. Kikuchi, *et al.* [4] reported that the SOC and neurotic tendencies has a moderate negative correlation in female nurses. Personality is affected by heredity and environmental factors just like the physical body structure [21]. In addition, SOC is not a naturally developing personality trait, but is learned and forms the personality through life experiences from puberty to the pre-adult stage of development [20]. Therefore, when thinking of SOC, it is necessary to consider the social and cultural background of the person.

With regard to past stressful experiences, the nurses who reported no stressful experiences had higher SOC scores. Hochwälder [22] reported that the high SOC score group had experienced fewer controllable negative life events (serious and long-lasting conflicts with a close relative, severe financial problems, and similar) in a longitudinal study of 30 years and older nurses in Sweden. Yamazaki, *et al.* [20] pointed out that nurses with high SOC scores, out of own interest consciously ignore stressors and are able to disregard these. These nurses are also successful in changing points of view, ideas, and perceptions of stressors. The present study was not a result of an investigation determining the number of stressful life events, and it cannot be directly compared for any degree of recognition of past experience, however. Still, it may be assumed that the high SOC score nurses in this study are able to cope with stress or make up their own minds to externalize

stressful events. Antonovsky [3] reported that the SOC level is enhanced by success in dealing with stressors. The authors found that nurses who realize they have overcome serious events have higher SOC scores, and it may be possible to support the hypothesis as one of the factors leading to responses resulting in higher SOC scores.

The present study identified that high self-esteem is related to a high SOC score. Hongo *et al.* [23] reported that a favorable attitude to the self was a positive relevant factor in the SOC in each grade (year of nursing study attendance) of female nursing students. There are no preceding studies which considered self-esteem together with nurse SOC scores, and the results here cannot be directly compared. However, Pallant and Lae [24] found a moderate positive correlation between SOC and self-esteem, and it may be presumed that self-esteem is related to the SOC score in the general population.

In addition, the participants of this study, the nurses who had someone to support them outside the workplace had higher SOC scores. Antonovsky [3] mentions that others who can bring sense, being trusted, being loved, being watched, and/or being accepted provide great value. The presence of such others could become a factor to increase the SOC level of nurses.

The SOC score of nurses in this study was clearly high when having a sense of work fulfillment. Here, the result of this study was similar to previous studies of the MSW of medical facilities [7]. For a stable occupational life, it is desirable to adjust the workplace environment to one that can make the job worthwhile.

C.   Characteristics of depression in Nurses

Among the factors related to the SOC scores in nurses determined in the multiple regression analysis (stepwise), the variable with the most explanatory power was determined as feelings of depression, and the specific features of respondents with feelings of depression and those without depressed feelings were further explored.

The age group where feelings of depression were strongest was in nurses in the 20s age group, and the group with the weakest feelings of depression was among nurses in the 50s age group. This is similar to the finding in [25] where the degree of depression also becomes lower with increasing age. A further factor for nurses with feelings of depression was those living alone, where there were few persons to help out away from the workplace, and where they reported not to receive assistance from supervisors/colleagues on the work. This result would support the finding that social support and health are positively related [8, 26, 27], and suggests the need for young nurses to be provided with enriched social support, in an approach tailored to the age of the specific life stage.

For ward assignment preferences, the nurses feeling more depressed were those that are not satisfied with their work assignment. In addition, the frequency of the nurses without feelings of depression who answered that they were satisfied with ward assignment despite the assignment not being that wished for was higher than that of the nurses with feelings of depression. Such a negative correlation between job

satisfaction and feelings of depression have also been reported elsewhere [4]. The inconsistency, that between assignment hopes and workplace satisfaction after assignment would be a factor in the feelings of depression. Also, in this study, the nurses with a sense of work fulfillment showed lower levels of depression. These results suggest that the challenge of work due to the gap between the ideal assignment and the actual assignment is not seen as positive. Antonovsky [3] reported that vocational experiences with specific elements preferable in the workplace environment such as job pleasure and pride, discretion, historical social and cultural connections, work complexity, and job security greatly influence SOC formation after adulthood. The SOC scores were lower in the group with feelings of depression than in the group without feelings of depression in this study. From this viewpoint, nursing supervisors need to strive to improve the SOC of nurses with feelings of depression by appropriately evaluating workplace satisfaction levels after assignment, and consider workplace change as identified by interviews.

For the quality of sleep, some studies report that poor sleep quality is related to poor health [28] and psychological stress [29]. In this study, the nurses who recognize that they cannot secure good sleep more easily feel depressed, consistent with previous studies. Also, in health practices, the nurses who are eating with others, regularly doing their own exercise, and having the opportunity to go out without being troubled had less of a feeling of depression. Based on these findings, it is desirable for administrators to determine items of sleep, diet, and exercise at workplace interviews to understand the daily life habits of nurses in the 20s age group who are more likely to feel depressed. Especially, to check the sleeping situation of staff where mental health is threatened is an important item for supervising staff.

As for the coping profiles of nurses, the group with feelings of depression does not adopt coping behaviors which involve "Actively solving problems" or "Seeking help for solutions" as much as the group without feelings of depression, but uses coping strategies of "Emotional expression involving (placing demands on) others", or "Avoidance and suppression." Participants in this study with high SOC scores are the problem solving type, and those with low SOC scores adopt emotional coping styles as in previous studies [30, 31]. To avoid and prevent depression, it may be effective to adopt the coping strategy with "Changing the point of view" used by the nurses without feelings of depression.

The authors are of the opinion that about the personal factors such as daily life habits and workplace environmental factors related to mismatches of assignment wishes and satisfaction with workplace assignments, supervisors should aim for an early grasp of nurse characteristics, especially for those in the 20s age group. Moreover, to ensure health in the workplace, administrators should try to prevent the development of depression in staff by paying attention to high and low SOC scores and coping profiles, as these will allow prediction of the mental health condition of nurses.

D. Study limitations

This study was conducted with four hospitals in the Kanto region of Japan and different results could be obtained in other institutions and areas. Additionally, as this was a cross–sectional study, no causal inferences can be made. In future studies, it will be necessary to include expanded areas and conduct a longitudinal study. Further, specific support such as how to improve the SOC is urgently needed, by obtaining knowledge of factors that affect and determine the level of SOC.

V. CONCLUSIONS

The factors related to SOC was depressed feelings, personality (tendency toward neurosis, cooperativeness, diligence), self - esteem, someone outside the workplace who will provide support in cases of troubles, past experience, coping profiles ("emotional expression involving others", "actively solving problems", and "seeking help for solutions"), a sense of work fulfillment. Especially noteworthy is that SOC is strongly relevant to feelings of depression. The nurses who experienced feelings of depression were with attributes like: age in the twenties, poorer social support, conflict between the ward assignment and desired ward, poor quality of sleep, not practicing healthy behaviors, and the coping style. It is extremely important to support the mental health of depressed nurses at the initial time of involvement in the nursing profession career.

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